**We Claim:**

1. A quasi-interpenetrating network of polymer chains, the chains comprising:

(a) linear polyacrylamide (LPA) chains in the form of a main frame having a weight average molecular weight of approximately 0.05 million to approximately 25 million g/mole, and a radius of gyration of approximately 10 nm to 350 nm; and

(b) polydimethylacrylamide (PDMA) chains prepared by polymerizing PDMA in the presence of the LPA main frame,

wherein the LPA and PDMA chains are entangled within one another and interpenetrate one another, and wherein the quasi-interpenetrating network has substantially no chemical cross-linking.

2. The network of Claim 1 wherein the LPA main frame is formed by inverse microemulsion polymerization.

3. The network of Claim 1 wherein the PDMA is polymerized by radical polymerization in the LPA main frame.

4. The network of Claim 1 wherein the LPA main frame comprises LPA in a buffer solution, wherein the LPA has an overlap concentration of approximately $5x10^{-4}$ to $4.0x10^{-2}$ g/ml.

5. The network of Claim 1 wherein the LPA main frame has an overlap concentration of approximately $1.2x10^{-3}$ g/ml in a buffer solution.

6. The network of Claim 1 wherein the lower boundary of the weight-average molecular weight of the LPA is approximately 0.05 million, 0.1 million, 0.3 million, 1 million, 4 million, 6 million or 7 million g/mole.

7. The network of Claim 1 wherein the upper boundary of the range of the weight-average molecular weight of the LPA is approximately 8 million, 10 million, 15 million or 25 million g/mole.

8. The network of Claim 1 wherein the lower boundary of the range of the radius of gyration of the LPA is approximately 10 nm, 15 nm, 28 nm, 55 nm, 125 nm, 150 nm or 165 nm

9. The network of Claim 1 wherein the upper boundary of the range of the radius of gyration of the LPA is approximately 180 nm, 210 nm, 250 nm or 350 nm.

10. The network of Claim 1 wherein the LPA has a polydispersity index of from about 1.01 to 1.8.

11. The network of Claim 10 wherein the lower boundary of the range of the polydispersity index of the LPA is approximately 1.01, 1.02, 1.05 or 1.1.

12. The network of Claim 10 wherein the upper boundary of the range of the polydispersity index of the LPA is approximately 1.3, 1.5, 1.6 or 1.8.

13. A quasi-interpenetrating network of entangled polymer chains, the chains comprising:

(a) linear polyacrylamide (LPA) chains; and

(b) polydimethylacrylamide (PDMA) chains entangled in the LPA chains and interpenetrating the LPA chains,

wherein the LPA and the PDMA have weight-average molecular weight of approximately 0.1 million to approximately 20 million g/mole, and radii of gyration of approximately 15 nm to 320 nm, wherein the quasi-interpenetrating network has substantially no chemical cross-linking.

14. The network of Claim 13 wherein the lower boundary of the range of the weight-average molecular weight is approximately 0.1 million, 0.5 million, 2 million or 6 million g/mole.

15. The network of Claim 13 wherein the upper boundary of the range of the weight-average molecular weight is approximately 7 million, 10 million, 16 million or 20 million g/mole.

16. The network of Claim 13 wherein the lower boundary of the range of the radii of gyration is approximately 10 nm, 15 nm, 40 nm, 80 nm or 150 nm.

17. The network of Claim 13 wherein the upper boundary of the range of the radii of gyration is approximately 165 nm, 210 nm, 280 nm or 320 nm.

18. The network of Claim 13 wherein the LPA and the PDMA each has a polydispersity index of from about 1.0 to 1.8.

19. The network of Claim 13 wherein the LPA and the PDMA each have a polydispersity index of about 1.6.

20. The network of Claim 13 wherein the network has an overlap concentration of approximately 5.0 $x10^{-4}$ to 3.0 $x10^{-2}$ g/ml in a buffer solution.

21. The network of Claim 13 wherein the ratio of the amount of LPA to the amount of PDMA is in the range of approximately 10 : 1 to 15 : 1 wherein the weight molecular weight range of the LPA is approximately from 6 million to 7 million g/mole.

22. A quasi-interpenetrating network of entangled polymer chains produced by a method comprising:

(a) providing a solution comprising linear polyacrylamide (LPA) and a buffer, wherein the LPA has a weight average molecular weight of 0.05 million to

25 million g/mole;

(b) providing a solution comprising polydimethylacrylamide (PDMA) and a buffer, wherein the PDMA has a weight average molecular weight of 100,000 to 25 million;

(c) mixing the LPA/buffer solution and PDMA/buffer solution in a stepwise fashion, wherein the LPA/buffer solution is one to fifteen times as concentrated as the PDMA/buffer solution, and the volume of the LPA/buffer solution is about one to fifty times the volume of the PDMA solution;

wherein a quasi-interpenetrating network of entangled, interpenetrating LPA and PDMA polymer chains is produced, where the quasi- interpenetrating network has substantially no chemical cross-linking.

23. The quasi-interpenetrating network of Claim 22 wherein the lower boundary of the range of the weight average molecular weight of the LPA is 0.05, 0.1, 0.3 or 1 million g/mole.

24. The quasi-interpenetrating network of Claim 22 wherein the upper boundary of the range of the weight average molecular weight of the LPA is 4 million, 6 million, 7 million, 8 million, 10 million, 15 million or 20 million g/mole.

25. The quasi-interpenetrating network of Claim 22 wherein the lower boundary of the range of the weight average molecular weight of the PDMA is 100,000; 300,000; or 500,000 g/mole.

26. The quasi-interpenetrating network of Claim 22 wherein the upper boundary of the range of the weight average molecular weight of the PDMA is 1 million, 3 million, 10 million or 25 million g/mole.

27. The quasi-interpenetrating network of Claim 22 wherein the LPA/buffer solution has a concentration of approximately 1.0 to 12.0% g/ml.

28. The quasi-interpenetrating network of Claim 22 wherein the PDMA/buffer solution has a concentration of approximately 0.1 to 3.0% g/ml.

29. In a method of separating charged molecular species, the method comprising causing a charged molecular species to migrate in a separation medium by the influence of an applied electric field, the improvement wherein the separation medium comprises an LPA polymer system and a PMDA polymer system wherein the polymer systems form a quasi-interpenetrating network.

30. The method according to Claim 29 wherein the interpenetrating network is prepared by synthesizing an LPA main frame, and polymerizing a PDMA within the main frame.

31. The method according to Claim 29 wherein the interpenetrating network is prepared by:

(a) providing a solution comprising LPA and a buffer, wherein the LPA has a weight average molecular weight of 0.05 million to 25 million g/mole;

(b) providing a solution comprising PDMA and a buffer, wherein the PDMA has a weight average molecular weight of 100,000 to 25 million g/mole; and

(c) mixing the LPA/buffer solution and PDMA/buffer solution in a stepwise fashion, wherein the LPA/buffer solution is one to fifteen times as concentrated as the PDMA/buffer solution, and the volume of the LPA/buffer solution is about one to fifty times the volume of the PDMA solution.

32. A quasi-interpenetrating network of polymer chains, the chains comprising:

(a) acrylamide (AM)/dimethylacrylamide (DMA) random copolymer chains in the form of a main frame having a weight average molecular weight of approximately 0.05 million to approximately 2 million g/mole, and a radius of gyration of approximately 10 nm to 80 nm; and

(b) polydimethylacrylamide (PDMA) chains prepared by polymerizing PDMA in the presence of the random copolymer main frame;
wherein the AM/DMA and PDMA chains are entangled within one another, and interpenetrate one another, and wherein the quasi- interpenetrating network has substantially no chemical cross-linking.

33. The network of Claim 32 wherein the random copolymer main frame is formed by radical polymerization.

34. The network of Claim 32 wherein the PDMA is polymerized by radical polymerization in the random copolymer main frame.

35. The network of Claim 32 wherein the random copolymer main frame comprises copolymers in a buffer solution, wherein the random copolymer has an overlap concentration of approximately $3x10^{-3}$ to $4.0x10^{-2}$ g/ml.

36. The network of Claim 32 wherein the copolymer main frame has an overlap concentration of approximately $1x10^{-2}$ g/ml in a buffer solution.

37. The network of Claim 32 wherein the lower boundary of the weight-average molecular weight range of the random copolymer is approximately 0.05 million, 0.1 million, or 0.3 million g/mole.

38. The network of Claim 32 wherein the upper boundary of the weight-average molecular weight range of the random copolymer is approximately 0.5 million, 1 million, or 2 million g/mole.

39. The network of Claim 32 wherein the lower boundary of the range of the radius of gyration of the copolymer is approximately 10 nm, 15 nm, or 30 nm.

40. The network of Claim 32 wherein the upper boundary of the range

of the radius of gyration of the copolymer is approximately 40 nm, 55 nm or 80 nm.

41. The network of Claim 32 wherein the random copolymer has a polydispersity index of from about 1.1 to 2.0.

42. The network of Claim 32 wherein the ratio of the amount of AM to the amount of DMA is in the range of approximately 5 : 1 to 50 : 1 wherein the weight molecular weight range of the random copolymer is approximately from 0.05 million to 2 million g/mole.

43. A quasi-interpenetrating network of entangled polymer chains produced by a method comprising:

(a) providing a solution comprising AM/DMA random copolymer and a buffer, wherein the AM/DMA random copolymer has a weight average molecular weight of 0.05 million to 2 million g/mole;

(b) providing a solution comprising polydimethylacrylamide (PDMA) and a buffer, wherein the PDMA has a weight average molecular weight of 0.05 million to 25 million g/mole;

(c) mixing the copolymer/buffer solution and PDMA/buffer solution in a stepwise fashion, wherein the copolymer/buffer solution is one to fifty times as concentrated as the PDMA/buffer solution, and the volume of the copolymer/buffer solution is about one to twenty times the volume of the PDMA solution;

wherein a quasi-interpenetrating network of entangled copolymer and PDMA polymer chains is produced, wherein the quasi-IPN has substantially no chemical cross-linking.

44. The quasi-interpenetrating network of Claim 43 wherein the lower boundary of the range of the weight average molecular weight of the copolymer is 0.05 million, 0.1 million, or 0.3 million g/mole.

45. The quasi-interpenetrating network of Claim 43 wherein the upper boundary of the range of the weight average molecular weight of the copolymer is 0.5 million, 1 million, 1.5 million, or 2 million g/mole.

46. The quasi-interpenetrating network of Claim 43 wherein the lower boundary of the range of the weight average molecular weight of the PDMA is 50,000; 100,000; or 200,000 g/mole.

47. The quasi-interpenetrating network of Claim 43 wherein the upper boundary of the range of the weight average molecular weight of the PDMA is 500,000, 1 million, 3 million, 5 million, 10 million, or 25 million.

48. The quasi-interpenetrating network of Claim 43 wherein the copolymer/buffer solution has a concentration of approximately 5.0 to 20.0% g/ml.

49. The quasi-interpenetrating network of Claim 43 wherein the PDMA/buffer solution has a concentration of approximately 0.1 to 1.0% g/ml.

50. In a method of separating charged molecular species, the method comprising causing a charged molecular species to migrate in a separation medium by the influence of an applied electric field, the improvement wherein the separation medium comprises an AM/DMA random copolymer and a PMDA polymer wherein the polymer systems form a quasi-interpenetrating network.

51. The method according to Claim 50 wherein the interpenetrating network is prepared by synthesizing an AM/DMA random copolymer main frame, and polymerizing a PDMA within the main frame.

52. The method according to Claim 50 wherein the interpenetrating network is prepared by:

(a) providing a solution comprising AM/DMA random copolymer and a buffer, wherein the AM/DMA random copolymer has a weight average molecular weight of 0.05 million to 2 million g/mole;

(b) providing a solution comprising PDMA and a buffer, wherein the PDMA has a weight average molecular weight of 50,000 to 25 million g/mole; and

(c) mixing the copolymer/buffer solution and PDMA/buffer solution in a stepwise fashion, wherein the copolymer/buffer solution is one to fifty times as concentrated as the PDMA/buffer solution, and the volume of the copolymer/buffer solution is about one to twenty times the volume of the PDMA solution;

wherein a quasi-interpenetrating network of entangled copolymer and PDMA polymer chains is produced, wherein the quasi-interpenetrating network has substantially no chemical cross-linking.